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APPLICATION NUMBER: ***60/544,622***
FILING DATE: ***February 13, 2004***
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV333436613US

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TITLE OF THE INVENTION (500 characters max)

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ENCLOSED APPLICATION PARTS ***(check all that apply)***

☑ Specification *Number of Pages* 18

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☑ Other (specify) Return Postcard

☑ Application Date Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.

☑ A check or money order is enclosed to cover the filing fees.

☐ The Director is herby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 08-1394

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE Amount ($): 80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

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REGISTRATION NO. 50,925
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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

PROVISIONAL APPLICATION COVER SHEET
Additional Page

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Xu et al	§	Attorney Docket No. 29981.
	§	Customer No. 27683
Serial No. Unknown	§	
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Filed: Herewith	§	
	§	Examiner:
For: Method and System for Providing Availability and Reliability for a Telecommunication Network Entity	§	

EXPRESS MAIL CERTIFICATE

Mail Stop Provisional Patent Application
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I hereby certify that the following attached papers and fee:

1. Provisional Application for Patent Cover Sheet (in duplicate);
2. Provisional Patent Application consisting of 18 pages of specification,
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Gayle Conner
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Signature

PROVISIONAL PATENT APPLICATION
Attorney Docket No.: 29981.72
Customer No. 27683

METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

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METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

BACKGROUND

[0001] The present disclosure relates generally to a method and system for a telecommunication node and, more particularly, to a method and system for providing geographical redundancy in a telecommunication network entity.

[0002] In telecommunication systems, the performance of a network entity (e.g., a serving entity) such as a switch may be judged by its availability and redundancy capabilities. Generally, such systems are designed to operate with the full capacity of such serving entities available at all times. Taking a telecommunication switch as an example, certain components may be rendered to failure, and may reduce the capability of the switch to support a full load of traffic at which the switch is designed to handle. This problem may lead to the disconnection of a certain number of users who are using the switch during a call and may prevent a certain number of new users from making new calls. This problem may also result in lost revenues to the network operator and to a lack of availability of services in emergency situations (e.g., an earthquake) in certain

geo-locations. Generally, the longer the down time of the telecommunication switch, the larger the financial losses to the network operator and the higher the impact on the human lives in our society. Accordingly, the operation abilities of a serving entity may be important in the network because it aids in defining the reliability factor of a communication between two parties and its failure may lead to the loss of calls and data information.

[0003] Therefore, what is needed is a method and system for maximizing the availability time of a telecommunication entity operating at full capacity and to provide geographical redundancy of that entity in the network.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Fig. 1 illustrates an example of one solution for providing redundancy of a network entity.

[0005] Fig. 2 illustrates one embodiment of a network architecture for providing geographical redundancy in a telecommunications system.

[0006] Fig 3a illustrates an exemplary call establishment phase for a mobile to land call within the network architecture of Fig. 2.

[0007] Fig 3b illustrates an exemplary call answer phase for a mobile to land call within the network architecture of Fig. 2.

[0008] Fig 4a illustrates an exemplary call establishment phase for a mobile to land call within the network architecture of Fig. 2 when the main call server is unavailable.

[0009] Fig 4b illustrates an exemplary call answer phase for a mobile to land call

within the network architecture of Fig. 2 when the main call server is unavailable.

[0010] Fig 5a illustrates an exemplary call establishment phase for a mobile to land call within the network architecture of Fig. 2 when the main call server has a partial failure.

[0011] Fig 5b illustrates an exemplary call answer phase for a mobile to land call within the network architecture of Fig. 2 when the main call server has a partial failure.

[0012] Fig 6a illustrates an IP-based heartbeat operation between a main and a redundant call server when an IP network is operational.

[0013] Fig 6b illustrates an SS7-based heartbeat operation between a main and a redundant call server when an IP network is not operational.

[0014] Fig 6c illustrates a call server switchover from a main to a redundant call server when the main call server becomes isolated and the IP network between the call servers is not operational.

[0015] Fig 6d illustrates a call server switchover from a main to a redundant call server when the main call server becomes isolated and the IP network between the call servers is operational.

[0016] Fig 6e illustrates a call server switchover from a redundant to a main call server when the main call server recovers and becomes fully operational and the IP network between the call servers is operational.

WRITTEN DESCRIPTION

[0017] The present disclosure relates generally to a method and system for a telecommunication node and, more particularly, to a method and system for providing geographical redundancy in a telecommunication network entity. It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of the disclosure. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

[0018] For the purposes of illustrating the present disclosure, various acronyms are used, the definitions of which are listed below:

ACM	Address Complete Message
ANM	Answer Message
BSS	Base Station System
BSSAP	Base Station System Application Part
BSSMAP	Base Station System Management Application Part
CCM	Call Control Module
DDM	Data Distribution Module
ESM	Ethernet Switching Module
GSM	Global System for Mobile communications
IAM	Initial Address Message
IP	Internet Protocol

ISUP	ISDN User Part (of SS7)
ISDN	Integrated Services Digital Network
MO	Mobile Originated
MS	Mobile Station
MSISDN	Mobile Station International ISDN Number
OPC	Originating Point Code
PC	Point Code
REL	Release
RLC	Release Complete
Rp	Route Primary
Rs	Route Secondary
SAM	Session Administration Module
SCCP	Signaling Connection Control Part. An SCCP message may carry BSSMAP, DTAP, TCAP or MAP messages.
SIM	SS7 Interface Module
SS7	Signaling System No.7
STP	Signaling Transfer Point
TDM	Time Division Multiplexing
UDP	User Datagram Protocol
WMG	Wireless Media Gateway

[0019] Referring to Fig. 1, one example of a partial solution for providing redundancy of a network entity is illustrated. The solution of Fig. 1 is achieved by duplicating all the hardware and software of a serving entity, and installing a redundant or duplicate entity in relatively close proximity to the network entity. If, due

to hazardous events, the serving entity goes out of service, the redundant network entity may become active and takes over all the services. However, this solution is relatively expensive given that a network operator has to purchase twice the amount of hardware and software for the functionality of a single entity.

[0020] In addition, this solution does not handle partial failure of the serving entity. In other words, if only some of the components in the serving entity go out of service, one solution is to completely shutdown the serving entity and activate the redundant entity. However, this is not an efficient solution given that all the components that did not fail in the serving entity become non-useable after the service is switched to the redundant entity. Furthermore, redundant trunks should be provided at the other entity and alternate routes should be setup, which may increases the operational costs and complexity in network design. In addition, active calls at the failed network may not survive from node failure.

[0021] Referring to Fig. 2, in one embodiment, an exemplary network architecture is illustrated for providing geographical redundancy. In the present example, the architecture is applied to a Soft-switch Mobile Serving Center (MSC), but it is understood that the architecture may be implemented using other network components. The illustrated soft-switch is presented where a Call Server is separated from the Wireless Media Gateway (WMG). It is noted that the Call server and the WMG both include a Soft-switch. The Call Server may be responsible for all call processing and management, as well as controlling the WMG. The WMG may be responsible for setting up and establishing a connection for a given call of any type upon the call server's request.

[0022] In Fig. 2, two call servers are presented. The call server in location 1 is the main call server and the one in location 2 is the redundant call server. Both call servers are connected to the WMG. If the main call server goes out of service or has a partial failure situation, the redundant call server in location 2 becomes active and starts handling calls from and towards one or both of the base station systems (BSS).

[0023] Each BSS is connected to the WMG with two links. One link is terminated at the main call Server, and the other at the redundant call server. The WMG acts as a cross-connect entity where the messages are transported transparently from the BSS to the call server. The message transmission is accomplished via a wireless network that supports the necessary protocols, such as BSSAP and SCCP over TDM.

[0024] Although there may be multiple cards in a call server, Fig. 2 illustrates only two types of cards: ESM and SIM cards. The ESM card is the interface to the IP network and is used to send any message from the call server to the IP network and receive any message from the IP network. The SIM card plays the same role except that it provides an interface the SS7 and Wireless networks. Note that the IP network is used to send control messages from the call server to the WMG and to exchange messages between the main and the redundant call server. The STP is part of the SS7 network and it acts as a transfer point between the call server and the destination where the message sent from the call server is terminated.

[0025] For routing purposes, each SS7 node in the network is assigned a Point Code (PC). As part of the solution presented in the present embodiment, the main and the redundant call servers have the same PC. To support the geographical redundancy solution presented herein, the STP node may be configured such that all messages terminating to the call server PC follow a Primary route (R_P). The latter is shown in Fig.

2 where the STP Primary route is to send the message to the main call server. If the link to the main call server is down, the STP will send the message to a secondary route (R_S). The secondary route takes the messages to the redundant call server. The link to the main call server becomes unavailable if the SIM card in the call server becomes non-functional.

[0026] Referring to Fig. 3a, an example of a mobile to land call within the architecture of Fig. 2 is illustrated. Fig. 3a provides only the call establishment phase of the call. Note that the cards SAM, CCM and DDM are used for different purposes. The SAM monitors the status of all remaining cards in the call server, and it also informs CCM about the WMG resources availability. The CCM applies all call processing for the received request. The DDM receives messages from the SIM and distributes them to the appropriate CCM. Note that there may be more than tone CCM card in a call server.

[0027] In step 1, the mobile sends a CM Service request to the network. The WMG relays this message to the main call server in location 1 via the wireless network. Given that the main call server is in full operation, the redundant call server blocks all links coming into its SIM card(s). Because of this, the BSS will send all requests to the links terminating on the main call server in location 1. In step 2, upon receiving the mobile request, the main call server starts the necessary radio procedures with the BSS and the mobile. The activities include mobile Authentication, Cyphering, TMSI reallocation and radio resources assignment. In step 3, once the call is accepted, the main call server sends an ISUP:IAM message out to the STP with destination as the "*called party number*" as requested by the mobile. In step 4, the main call server establishes the appropriate termination points at the WMG to reserves the necessary resources. In step 5, the main

call server synchronizes the call information with the redundant call server in location 2 by sending the necessary messaging over the IP network. This is so that if the CCM card in the main call server goes down, the standby CCM card in the redundant call server can maintain the call. The SAM in the main call server will inform the SAM in the redundant call server. The SAM in the redundant call server then informs the local standby CCM to take over the call.

[0028] Referring to Fig. 3b, a continuation of the mobile to land call (Fig. 3a) is illustrated for the call answer phase of the call. In step 1, the ISUP:ANM message is received at the main call server from the STP. In step 2, the main call server informs WMG to complete the resources establishment for a 2-way connection. In step 3, the main call server sends the DTAP: Connect message to the call originating mobile, hence connecting the mobile with the called party. In step 4, the main call server synchronizes the call information with the redundant call server in location 2.

[0029] Referring to Fig. 4a, an example of a mobile to land call when the main call server is unavailable is illustrated. The example provides only the call establishment phase of the call. In step 1, the mobile sends a CM Service request to the network. Given that the links to the main call server in location 1 are not available due to call server unavailability, the BSS will send all requests to the links terminating on the redundant call server in location 2. In step 2, upon receiving the mobile request, the redundant call server starts the necessary radio procedures with the BSS and the mobile. The activities include mobile Authentication, Cyphering, TMSI reallocation and radio resources assignment. In step 3, once the call is accepted, the redundant call server in location 2 sends an ISUP:IAM message out to the STP with destination as the *"called party number"* as requested by the mobile. In step 4, the redundant call server

establishes the appropriate termination points at the WMG to reserves the necessary resources.

[0030] Referring to Fig. 4b, a continuation of the mobile to land call (Fig. 4a) is illustrated when the main call server is unavailable. The example provides only the call answer phase of the call. In Step 1, the ISUP: ANM message is received from the STP at the redundant call server. Note that the STP will use the secondary route to send the message to the redundant call server in location 2 given that the route to the main call server in location 1 is not available. In step 2, the redundant call server informs WMG to complete the resources establishment for a 2-way connection. In step 3, the redundant call server sends the DTAP: Connect message to the call originating mobile, hence connecting the mobile with the called party.

[0031] Referring to Fig 5a, an example of a mobile to land call when the main call server has a partial failure is illustrated. The example provides only the call establishment phase of the call. In step 1, the mobile sends a CM Service request to the network. The WMG relays this message to main call server in location 1 via the wireless network. Note that given that the main call server is not completely down and the links to BSS are available, links from BSS to the redundant call server in location 2 are blocked. Hence, the BSS will send all requests to the links terminating on the main call server in location 1. In step 2, upon receiving the mobile request, the DDM in the main call server realizes that the active CCM to handle this call is in the redundant call server in location 2. Hence, it forwards the call request to the appropriate CCM in the call server in location 2. Note that the DDM is aware of the CCM status because when the CCM card goes down, SAM is notified and by turn it informs all cards in the call server of the status of that CCM card. Upon receiving the call request, the CCM in the

redundant call server starts the necessary radio procedures with the BSS and the mobile. The activities include mobile Authentication, Cyphering, TMSI reallocation and radio resources assignment. To complete the call establishment procedure, 12 messages are exchanged between the CCM in he redundant call server and the SAM in the main call server. These messages are exchanged over the IP network. In step 3, once the call is accepted, the main call server sends an ISUP:IAM message out to the STP with destination as the *"called party number"* as requested by the mobile. In step 4, the CCM in the redundant call server establishes the appropriate termination points at the WMG to reserves the necessary resources.

[0032] Referring to Fig 5b, a continuation of the mobile to land call (Fig. 5a) when the main call server has a partial failure is illustrated. The example provides only the call answer phase of the call. In step 1, the ISUP: ANM message is received from the STP at the main call server. Note that the STP will use the primary route to send the message to the call server. In step 2, upon receiving the ANM message, the DDM in the main call server realizes that the active CCM to handle this message is in the redundant call server in location 2. Hence, it forwards the message to the appropriate CCM card in the call server in location 2. In step 3, the CCM in the redundant call server informs WMG to complete the resources establishment for a 2-way connection. In step 4, the CCM in the redundant call server then sends the DTAP: Connect message to the call originating mobile via the SIM card in the main call server in location 1. The mobile is connected to the called party.

[0033] In some embodiments, a "heartbeat" may be used to inform the call servers in both locations about the availability of the other call server. This informs each call server that the other call server is active and is handling calls with no problems. This

reflects in allowing the redundant call server to take over the service when the main call server cannot process calls, and the main call server to take over the service from the redundant call server after it has fully recovered.

[0034] The heartbeat solution may include transferring a single message from one location to another on a periodic basis. The transmission frequency may be configurable and defined in the call server. If a call server does not receive the heartbeat, it may use another mechanism to exchange a secondary heartbeat over a different network. If the secondary heartbeat is not received, the call server may be configured to assume that the other call server has a problem and cannot handle any calls.

[0035] Referring to Fig. 6a, in one embodiment, an IP heartbeat solution is presented. In this solution, each call server sends an IP-based heartbeat message to the other call server over the IP network. This message is initiated from the SAM and sent to the local ESM. The local ESM forwards the message over the IP network to the ESM located in the other call server. The ESM receiving the message then forwards the message to the local SAM. In this scenario, it is considered that the main call server in location 1 is active and processing calls, while the redundant call server in location 2 is standby.

[0036] Referring to Fig. 6b, an SS7 heartbeat solution is presented. This heartbeat mechanism may be used when the heartbeat over the IP network (Fig. 6a) is not received. After a heartbeat timer expires, each call server may send a different heartbeat message using the SS7 network. To achieve this, the SAM may send a trigger to the SCCP application residing on the local SIM card. SCCP then sends an "SCCP Connection Request" message to the other call server. Another solution includes having the SCCP application send a SubSystem_Test (SST) message to the other SIM

card in the other call server. In either solution, each call server is equipped with and identified by a different PC. This PC may be private and may not be known to any other node in the network. When the SIM in the other call server receives the SCCP message, it sends a trigger to the local SAM, effectively telling the SAM that the other call server is available. The heartbeat over SS7 may be achieved by having each call server send the SCCP message on a periodic basis. The period of heartbeat transmission may be the same as that used for the IP heartbeat, or may be another configurable parameter. In this scenario, the main call server in location 1 is active and processing calls, while the redundant call server in location 2 is on standby during the duration of the IP network failure. After the main heartbeat (via IP network) is resumed, the heartbeat via the SS7 network may be stopped.

[0037] Referring to Fig. 6c, an example is illustrated where the heartbeat of the main call server is not received at the redundant call server because the IP and the SS7 links at the main call server are down. In this case, the redundant call server takes control of the calls and brings itself into service.

[0038] Referring to Fig. 6d, an example is illustrated where the heartbeat of the main call server is exchanged over the IP network successfully. However, the SS7 links are down in the main call server. With this limitation, the main call server cannot handle calls, and it initiates a switch-over command to the redundant call server by requesting that the redundant call server bring itself into service and take over all the calls.

[0039] Referring to Fig. 6e, an example is illustrated where, after the SS7 links at the main call server are recovered, it initiates a switch-back command to the redundant call server by requesting that the redundant call server pass back control to the main location.

[0040] Accordingly, the present disclosure may provide reliability in a telecommunication network entity despite events such as fire, earthquake, hardware stress, and hardware failure, as well as other causes such as software failures and others.

[0041] The above disclosure provides many different embodiments, or examples, for implementing the disclosure. However, specific examples, and processes are described to help clarify the disclosure. These are, of course, merely examples and are not intended to limit the disclosure from that described in the claims. For instance, even though a wireless telecom entity was used for purposes of illustration, the present disclosure may be applied to wireline telecom entities. In addition, even though a soft-switch was used in the various embodiments, the present disclosure may be applied to any switch technology, including those that do not use a physical split between the bearer and signaling plans. Also, even though a wireless network and wireless services were used to describe the disclosure, the present disclosure may be applied to non-wireless applications and non-wireless networks. Additionally, even though a mobile to land call was used for purposes of illustration, it is understood that the present disclosure may be applied to any call scenario, including mobile-to-mobile, land-to-mobile, land-to-land, and others. Furthermore, even though a specific number of cards and interfaces were described with respect to each call server, the present disclosure may be applied to any number of cards and configurations in the call server. In addition, even though two call servers were described, the present disclosure may be applied for many call servers deployed in a network. Also, even though four STPs were used to describe the disclosure, the present disclosure may be applied to any number of STPs.

[0042] Furthermore, even though the SCCP messages "Connection Request" and "SubSystem Test" were used to represent the heartbeat between call servers, it is understood that other messages may be used. In addition, even though a CCM failure was used to represent a partial failure scenario in the main call server, the present disclosure may be applied to any card failure in the call server, including failure of a DDM and/or SIM card. Also, even though one CCM card was used to describe a partial failure scenario, the present disclosure may be applied to multiple cards and to any kind of failure in a call server. In addition, even though the present disclosure applies the concept that all traffic is sent to the main call server from BSS and STP, the present disclosure may be applied to other scenarios where the traffic load coming from the BSS and STP is shared and sent to either the main call server or the redundant call server. In this alternative concept, there may be no need to configure primary and secondary routes at the STP, and none of the SS7 links to the BSS may need to be blocked. However, the traffic load on the IP network between the main and the redundant call server may increase, and some additional intelligence may be required in the CCM card to route the messages to the appropriate SIM in the local or the remote call server in order to balance the load between the main and the redundant call servers.

[0043] Furthermore, even though the present disclosure utilizes the concept where all the standby CCM cards are located in the redundant call server, the present disclosure may also be applied if the standby CCM cards are located in the main call server with the other active CCM cards. In this case, during CCM card failure, the messages may be sent to the standby CCM card in the same call server, and so the messages do not go the redundant call server. Other described features may still be applied, such as the heartbeat solution and Call Server switch-over and switch-back solution.

[0044] Furthermore, even though the present disclosure describes that the heartbeat is sent on the SS7 network only if the IP network fails, the present disclosure may be applied if the standard heartbeat is the one sent on the SS7 network and the heartbeat is sent over the IP network only if the SS7 network fails. It is understood that aspects of the various embodiments may be implemented using software and/or hardware solutions.

[0045] While the disclosure has been particularly shown and described with reference to the preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the disclosure, as set forth in the following claims.

WHAT IS CLAIMED IS:

1. A system for providing redundancy for an entity in a telecommunications network, the system including:

a first call server adapted to send and receive traffic; and

a second call server configured to operate as a redundant call server, wherein the second call server takes control of at least a portion of the traffic if the first call server partially or completely fails.

2. A method for providing redundancy for an entity in a telecommunications network, the system including:

detecting that a first call server has become partially or completely disabled; and

redirecting traffic from the first call server to a second call server.

Serial No. NA - 29981.72
Xu et al
METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

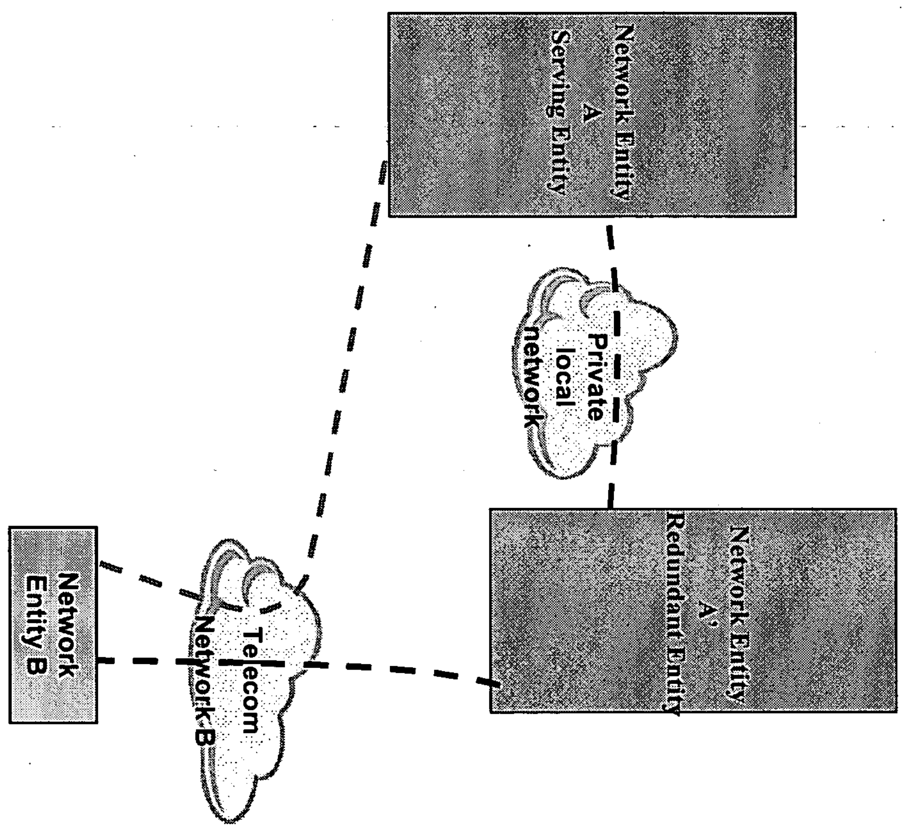

Fig. 1

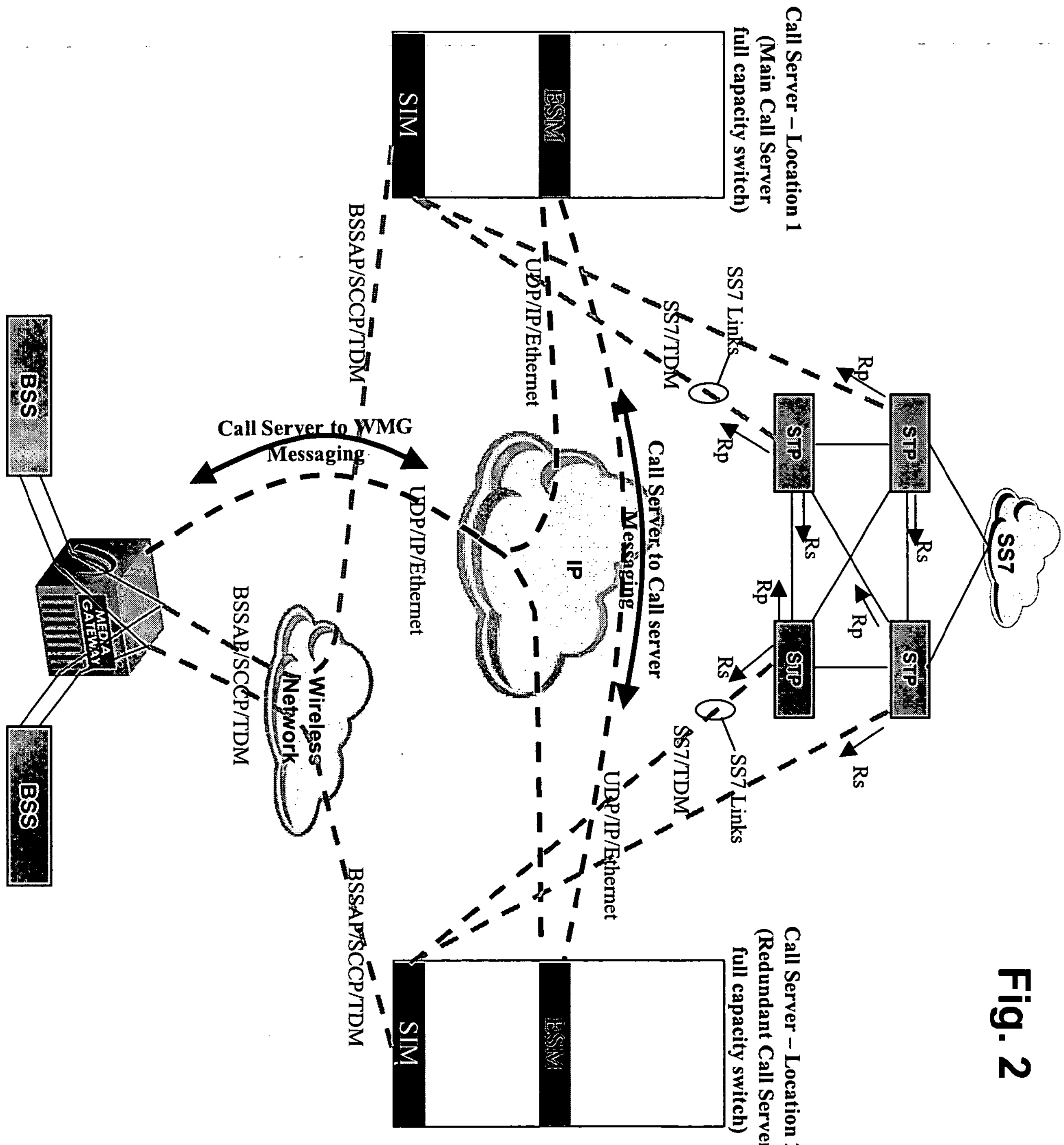
Call Server – Location 1
(Main Call Server
full capacity switch)
ESM
SIM
Call Server – Location 2
(Redundant Call Server
full capacity switch)
ESM
SIM
SS7
STP
STP
STP
STP
Rp
Rs
SS7 Links
SS7/TDM
UDP/IP/Ethernet
IP
Call Server to Call server
Messaging
Call Server to WMG
Messaging
BSSAP/SCCP/TDM
Wireless
Network
MEDIA
GATEWAY
BSS
BSS

Fig. 2

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METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

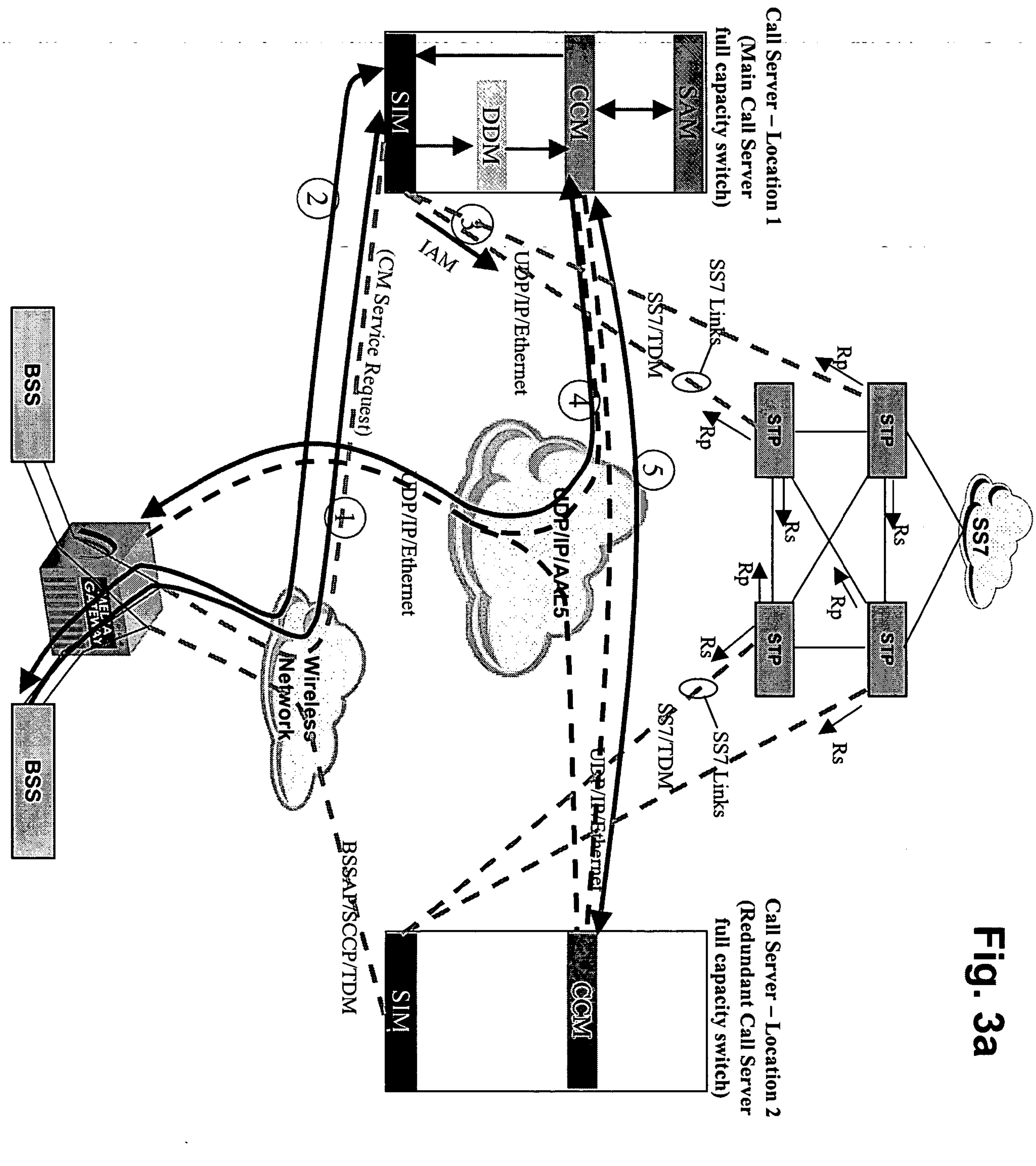

Fig. 3a

Serial No. NA - 29981.72
Xu et al
METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

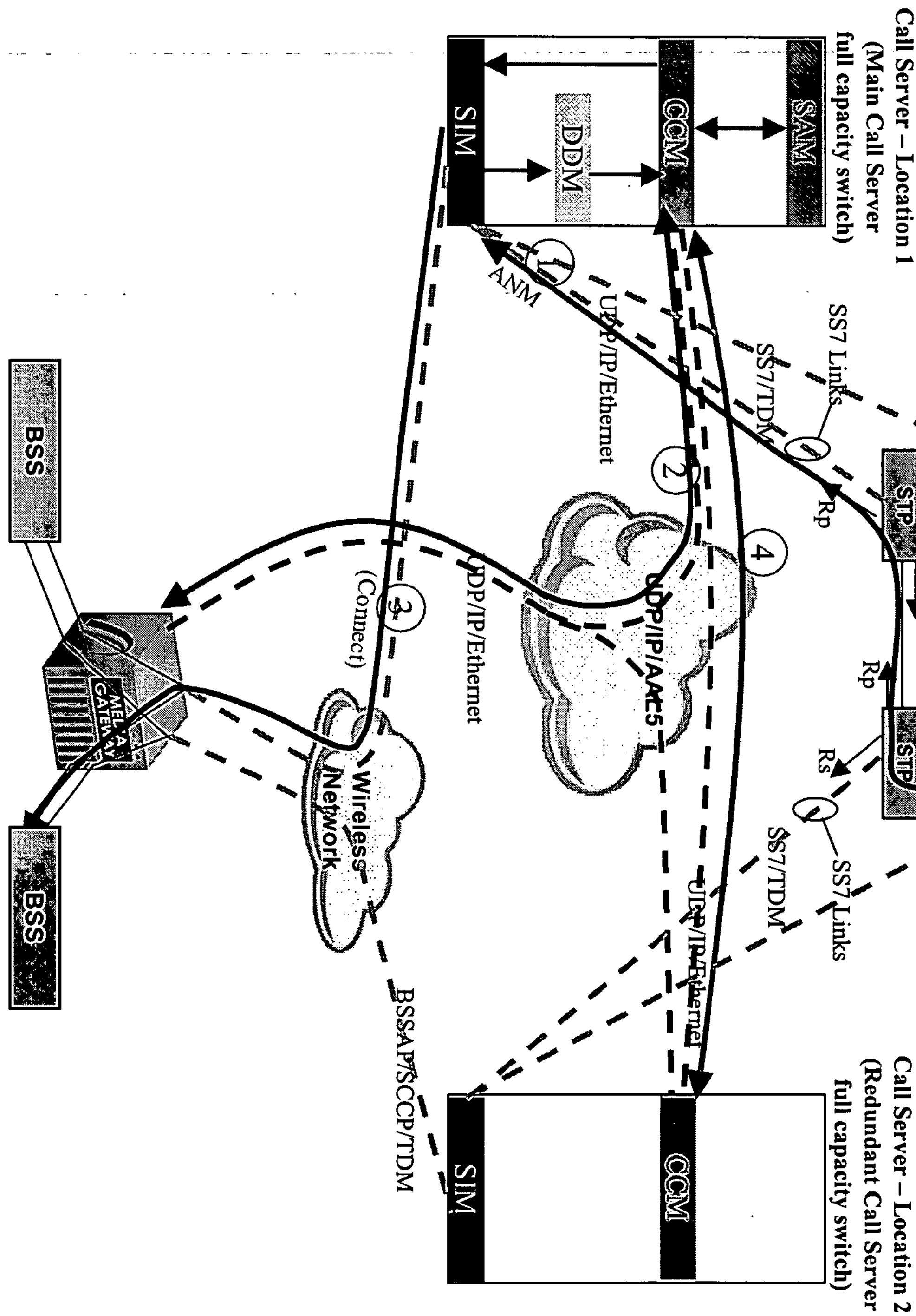

Fig. 3b

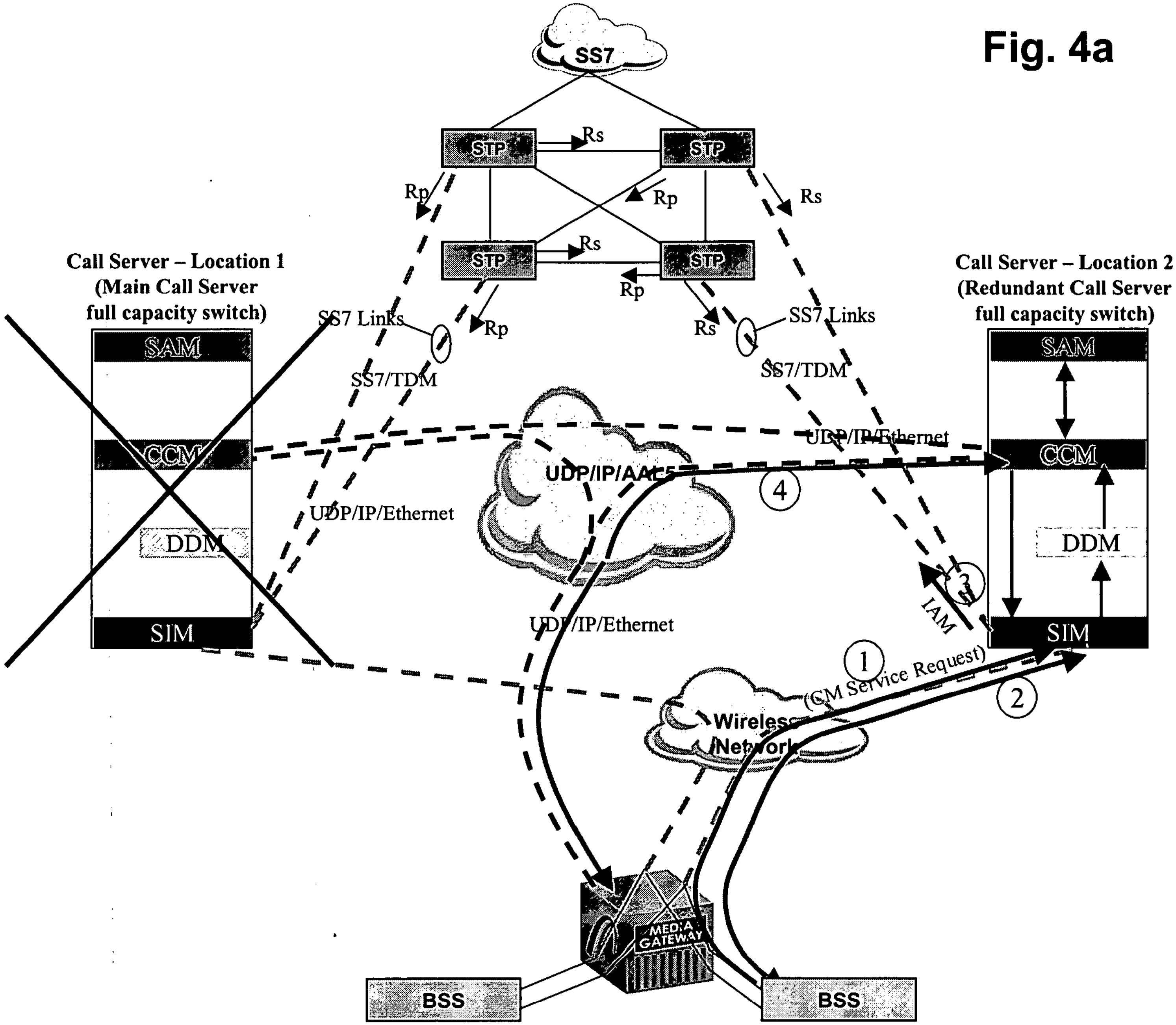
SS7
STP
STP
STP
STP
Rs
Rp
Call Server – Location 1
(Main Call Server
full capacity switch)
SAM
CCM
DDM
SIM
SS7 Links
SS7/TDM
UDP/IP/Ethernet
UDP/IP/AAL5
4
UDP/IP/Ethernet
Call Server – Location 2
(Redundant Call Server
full capacity switch)
SAM
CCM
DDM
SIM
3
IAM
1
(CM Service Request)
2
Wireless
Network
MEDIA
GATEWAY
BSS
BSS

Fig. 4a

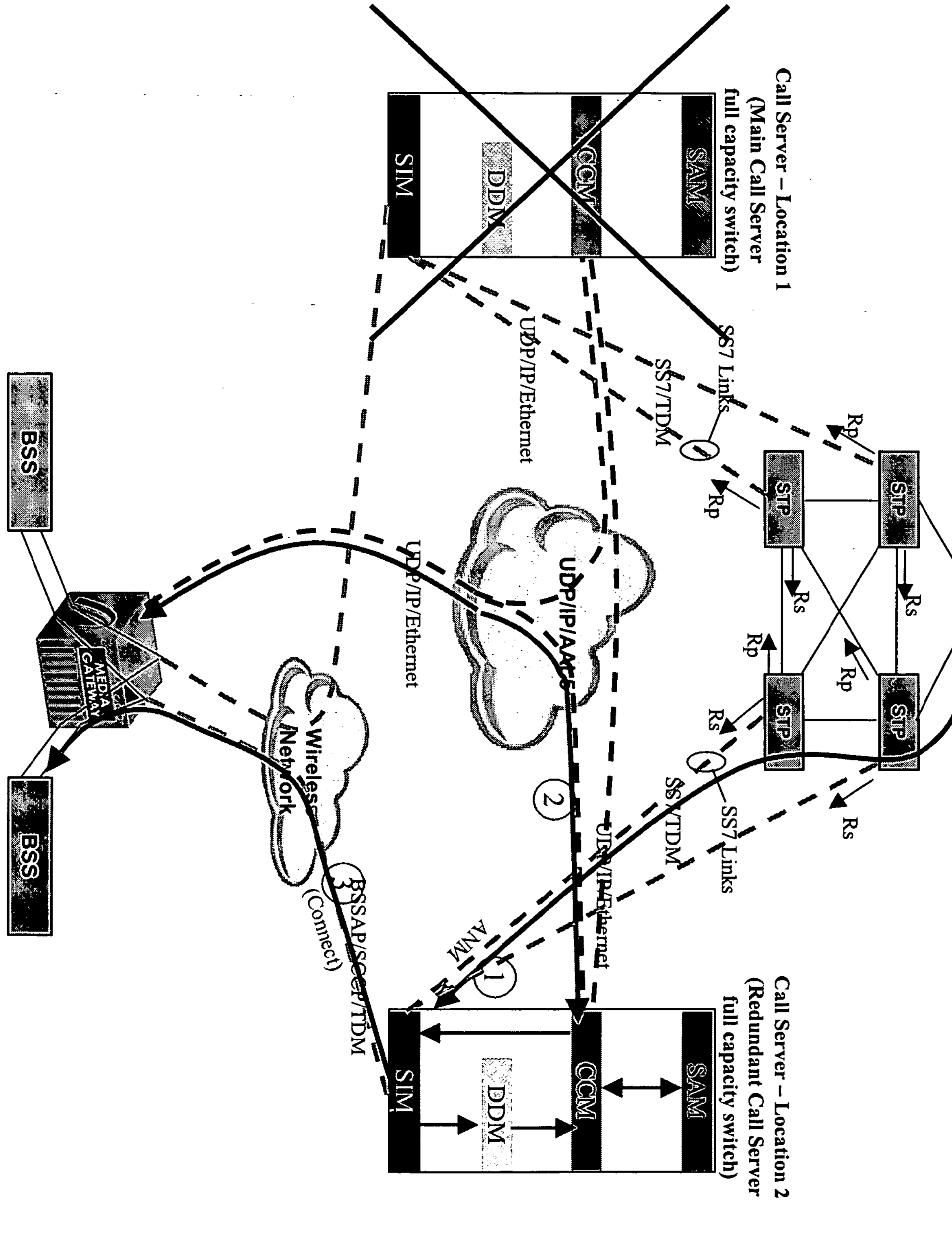
Call Server – Location 1 (Main Call Server full capacity switch)
SAM
CCM
DDM
SIM
SS7 Links
SS7/TDM
UDP/IP/Ethernet
Rp
Rs
STP
SS7
UDP/IP/Ethernet
MEDIA GATEWAY
BSS
BSS
Wireless Network
SS7/TDM
SS7 Links
ANM
1
2
3
BSSAP/SCCP/TDM
(Connect)
Call Server – Location 2 (Redundant Call Server full capacity switch)
SAM
CCM
DDM
SIM

Fig. 4b

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METHOD AND SYSTEM FOR PROVIDING
AVAILABILITY AND RELIABILITY FOR A
TELECOMMUNICATION NETWORK ENTITY

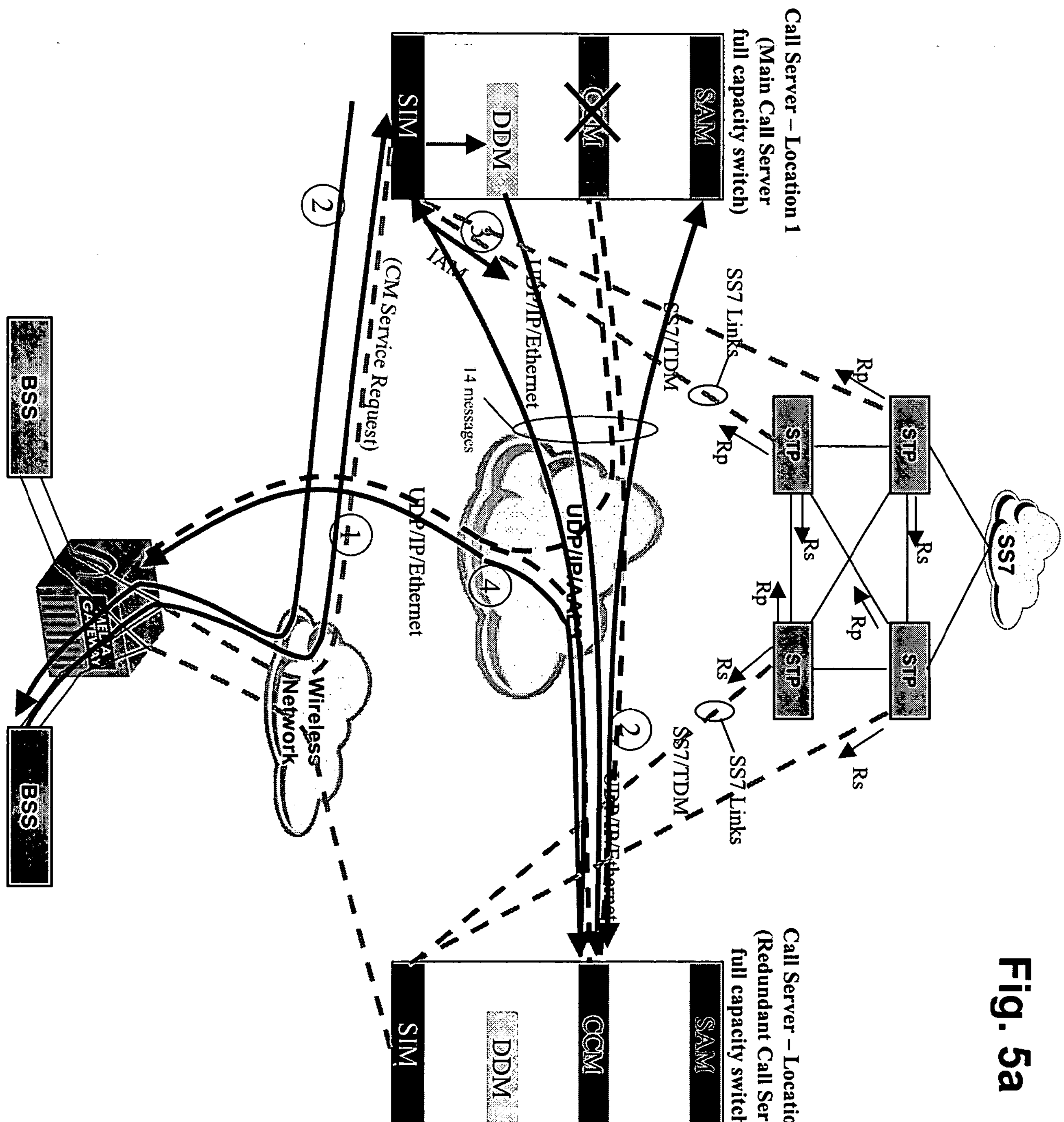

Fig. 5a

Serial No. NA - 29981.72
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METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

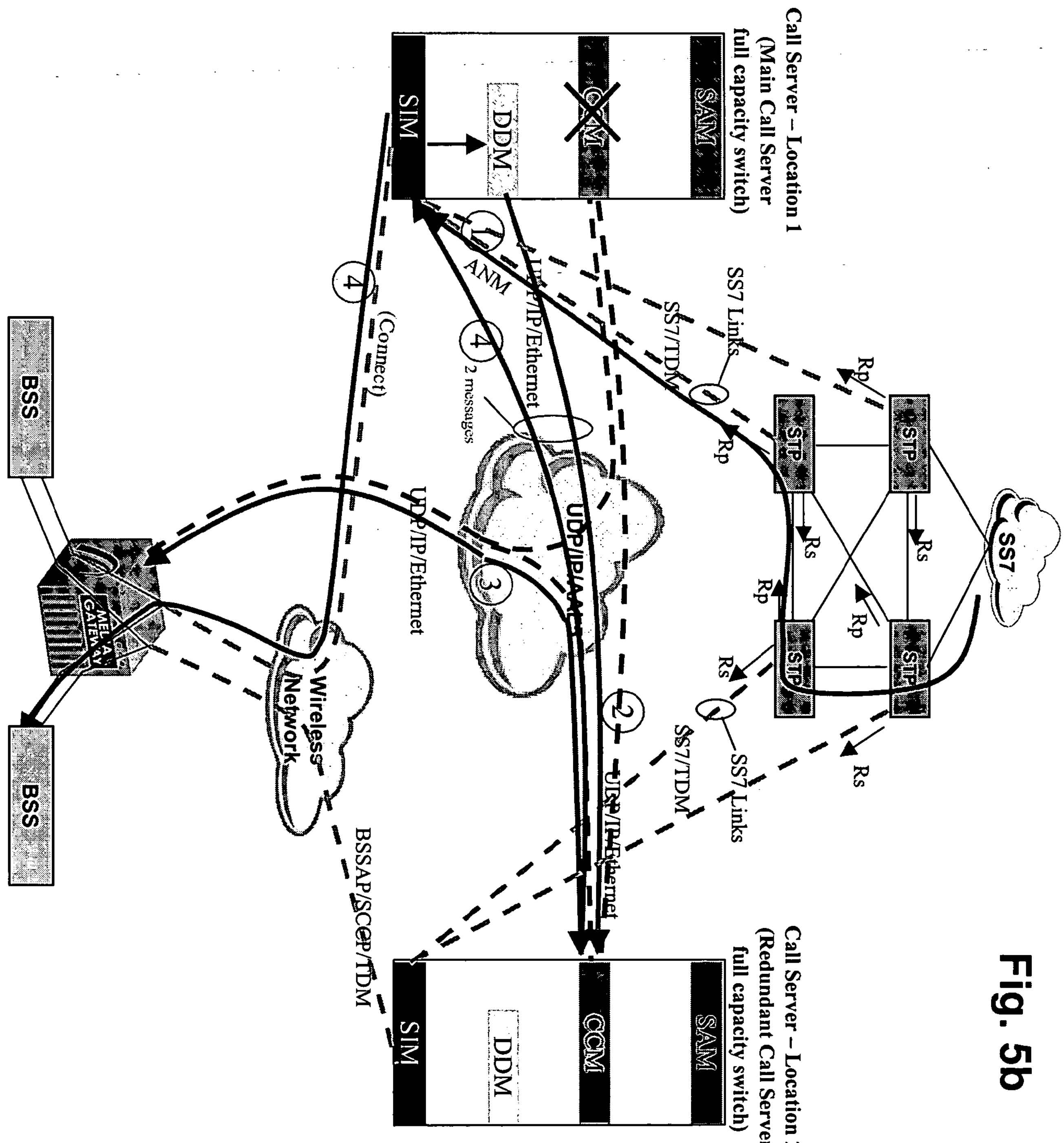


Fig. 5b

Fig. 6a

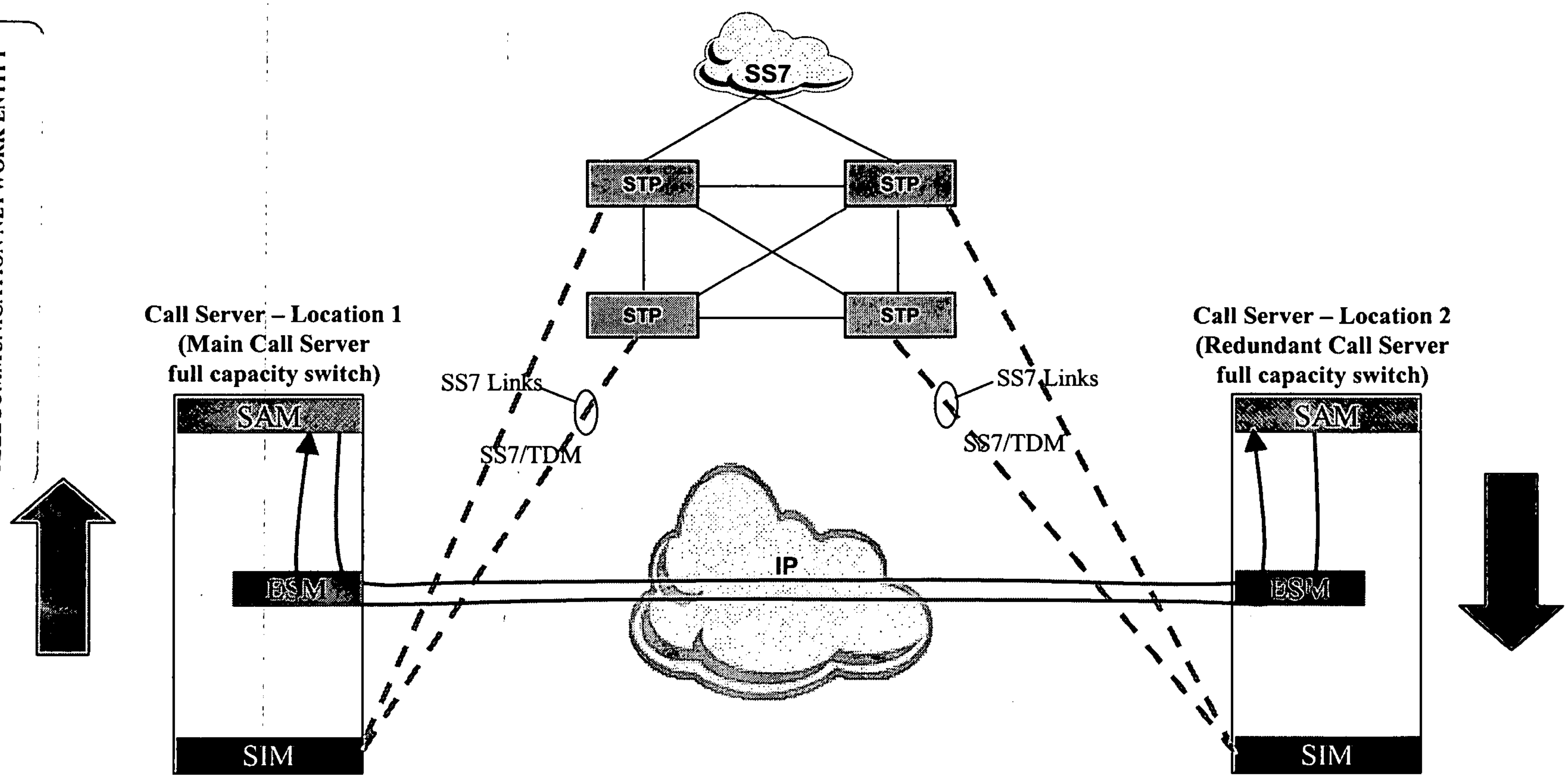

SS7
STP
STP
STP
STP
Call Server – Location 1
(Main Call Server
full capacity switch)
SAM
ESM
SIM
SS7 Links
SS7/TDM
IP
SS7 Links
SS7/TDM
Call Server – Location 2
(Redundant Call Server
full capacity switch)
SAM
ESM
SIM

Fig. 6b

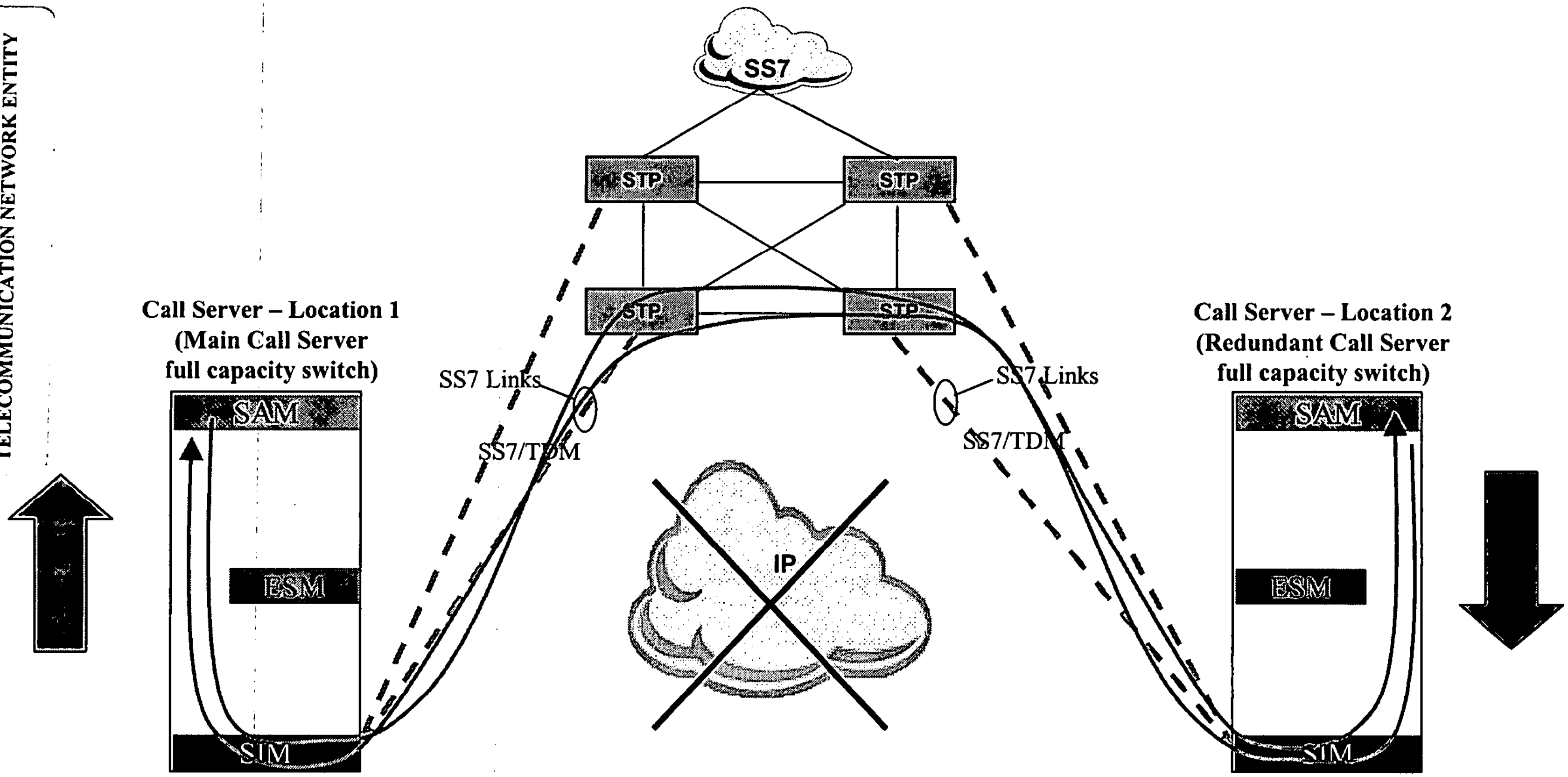
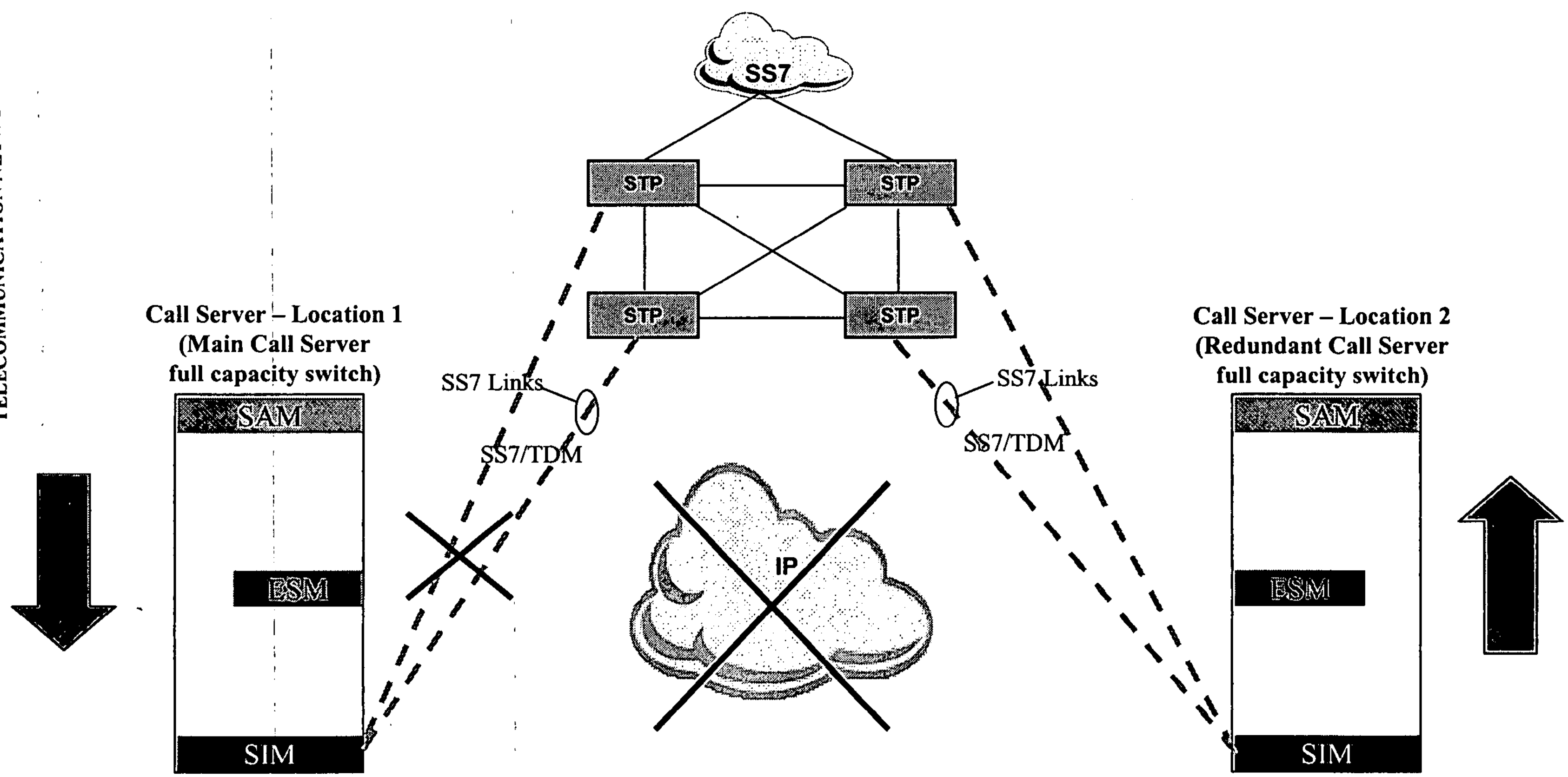

SS7
STP
STP
STP
STP
Call Server – Location 1
(Main Call Server
full capacity switch)
SAM
ESM
SIM
SS7 Links
SS7/TDM
IP
SS7 Links
SS7/TDM
Call Server – Location 2
(Redundant Call Server
full capacity switch)
SAM
ESM
SIM

Fig. 6c


SS7
STP
STP
STP
STP
Call Server – Location 1
(Main Call Server
full capacity switch)
SAM
ESM
SIM
SS7 Links
SS7/TDM
IP
SS7 Links
SS7/TDM
Call Server – Location 2
(Redundant Call Server
full capacity switch)
SAM
ESM
SIM

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METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

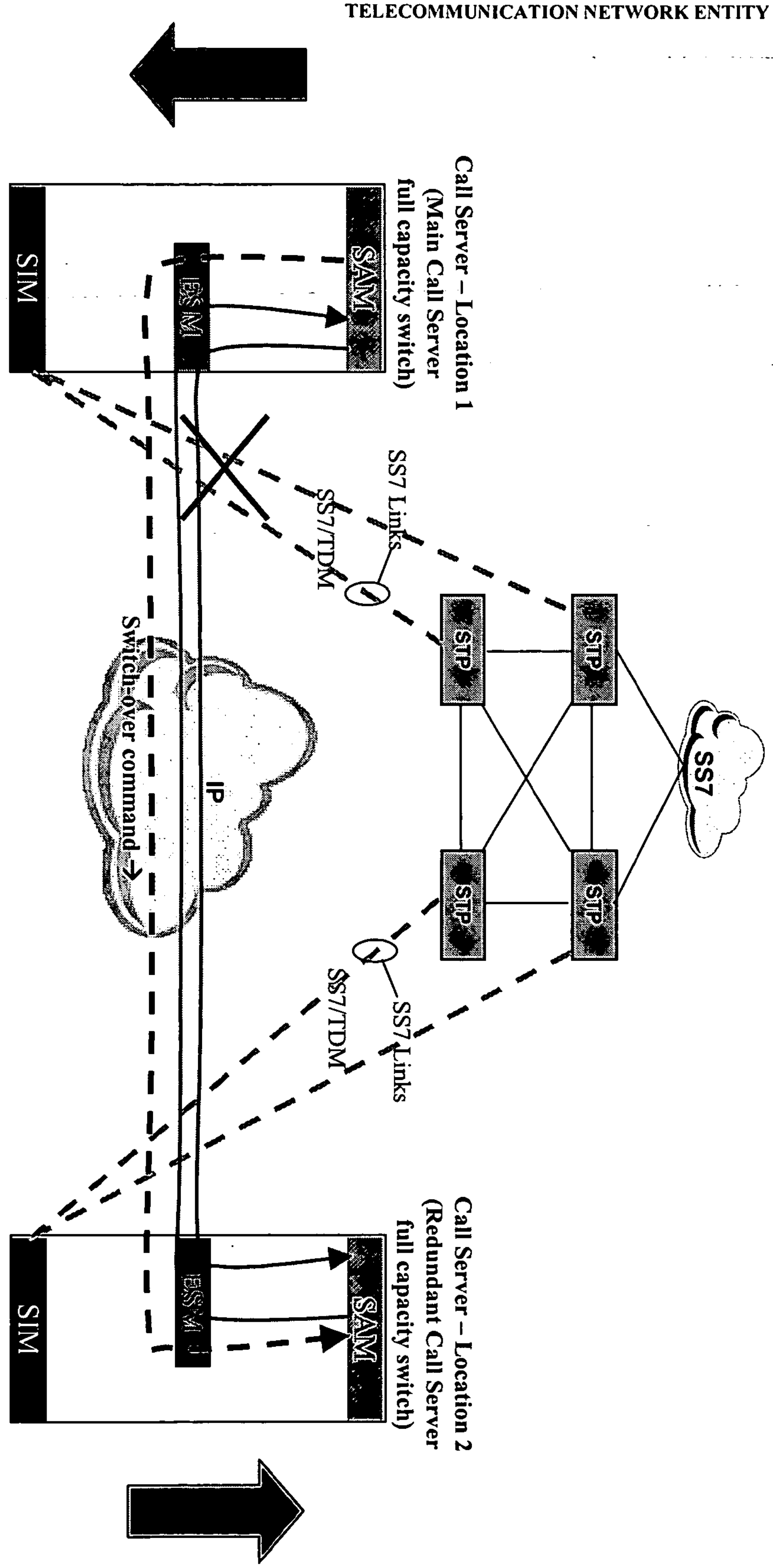

Fig. 6d

Serial No. NA - 29981.72
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METHOD AND SYSTEM FOR PROVIDING AVAILABILITY AND RELIABILITY FOR A TELECOMMUNICATION NETWORK ENTITY

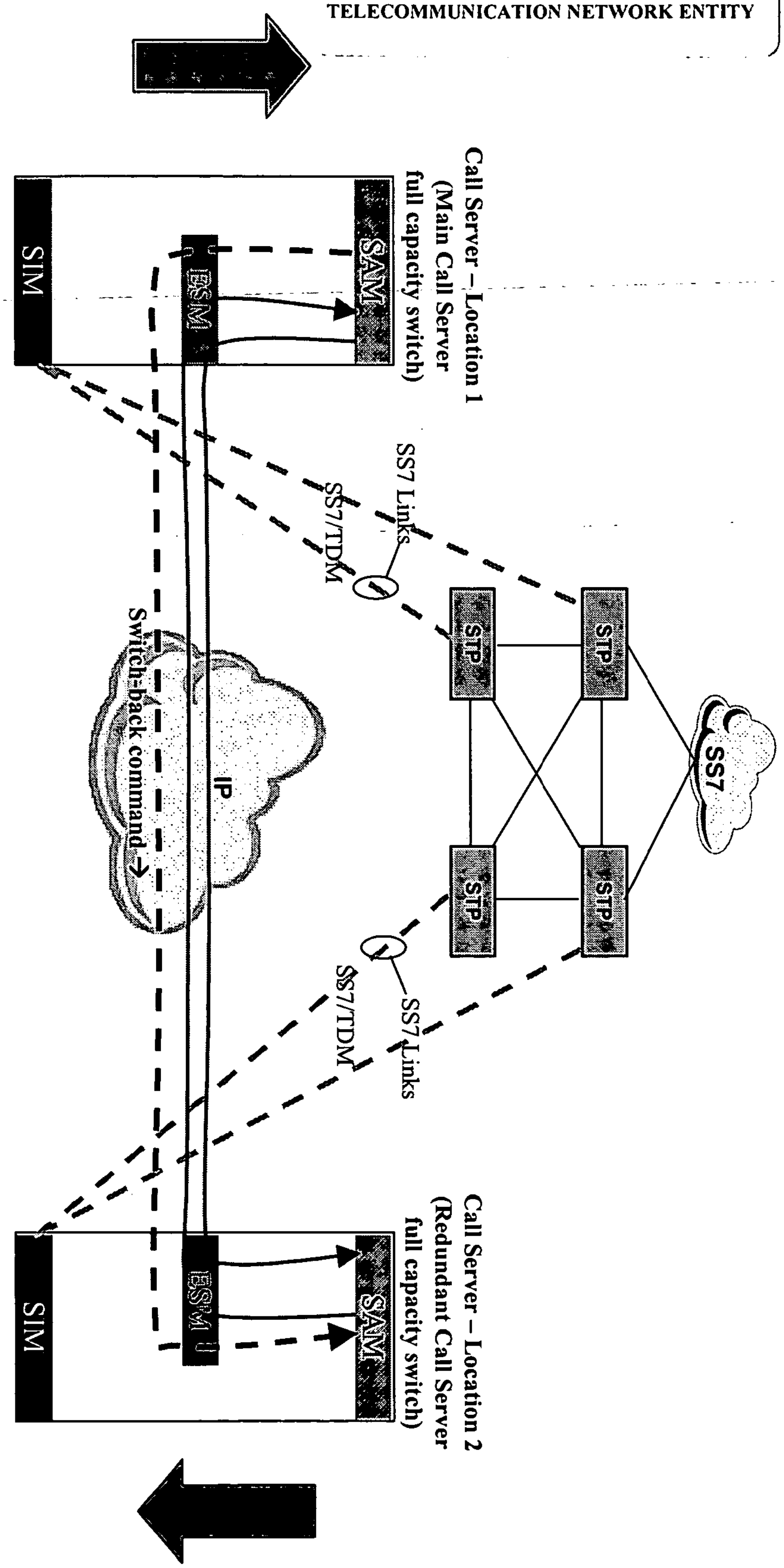

Fig. 6e

Applicant Information

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Citizenship Country::	Canada

Applicant Authority Type::	Inventor
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Postal or Zip Code::	75080
Citizenship Country::	India

Applicant Authority Type::	Inventor
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City::	Plano
State or Province::	TX
Postal or Zip Code::	75025
Citizenship Country::	USA

Correspondence Information

Correspondence Customer Number:: 000027683

Application Information

Title Line One::	METHOD AND SYSTEM FOR PROVIDING
Title Line Two::	AVAILABILITY AND RELIABILITY FOR A
Title Line Three::	TELECOMMUNICATION NETWORK ENTITY
Total Drawing Sheets::	13
Formal Drawings?::	No
Application Type::	Provisional
Docket Number::	29981.5
Secrecy Order in Parent Appl?::	No

Representative Information

Registration Number::	50,925

Assignee Information

Assignee Name::	Spatial Communications Technologies, Inc.
Street of mailing address::	1651 Glenville Dr., #210
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State or Province::	TX
Country of mailing address::	USA
Postal or Zip Code::	75081